

## APPARATUS AND METHODS FOR TREATING TISSUE

### CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation of U.S. Patent Application Serial No. 09/898,726 filed July 3, 2001, which is a continuation-in-part of U.S. Patent Application Serial No. 09/602,436 filed June 23, 2000, which in turn claims benefit from U.S. Provisional Patent Application Serial No. 60/141,077 filed June 25, 1999, each being incorporated herein by reference in its entirety.

*now U.S. Pat. No. 6,626,899,*  
*now U.S. Pat. No. 6,669,687,*

(A)

### FIELD OF THE INVENTION

[0002] The present invention relates to treatment of tissue. More particularly, the present invention provides methods and apparatus for treating valvular disease with a catheter inserted into a patient's cardiac chambers, the catheter having an end effector for modifying cardiac structures, including valve leaflets and support structure.

### BACKGROUND OF THE INVENTION

[0003] Degenerative valvular disease is the most common cause of valvular regurgitation in human beings. Regurgitation is typically characterized by an expanded valve annulus or by lengthened chordae tendineae. In either case, an increase in the geometry of a valve or its supporting structure causes the valve to become less effective, as it no longer fully closes when required.

[0004] Loose chordae tendineae may result, for example, from ischemic heart disease affecting the papillary muscles. The papillary muscles attach to the chordae tendineae and keep the leaflets of a valve shut. Some forms of ischemic cardiac disease cause the papillary muscles to lose their muscle tone, resulting in a loosening of the chordae tendineae. This loosening, in turn, allows the leaflets of the affected valve to prolapse, causing regurgitation.

[0005] It therefore would be desirable to provide methods and apparatus for treatment of tissue that modify the geometry and operation of a heart valve.